LESSON **7-3**

Success for English Language Learners

Triangle Similarity: AA, SSS, and SAS

Steps for Success

Step I Introduce the lesson.

- Explain to students that they will be investigating some special ways they can use to prove triangles similar or not similar.
- Help students identify angles as included angles or nonincluded angles. Draw and label a triangle on the board. Orally name two sides of the triangle and have students name the included angle and/or the nonincluded angles of the triangle. You may also have students draw their own triangles, mark two sides, then trade drawings and have them name the angles as included or nonincluded.
- Review the different theorems that students used to prove that triangles are congruent. Help students understand that they will be using related theorems to prove similarity.

Step II Teach the lesson.

- During the lesson, you might ask students to predict how the problem will be solved before they read the solution.
- Discuss with students the minimal information needed to prove that two triangles are similar. Ask students to suggest several scenarios, and have them justify their conclusions. Conversely, ask students to determine the maximum information they could have about two triangles and *not* be able to prove similarity. You might pair English learners and English speakers in small groups to provide their own lists for these challenges.

Step III Ask English Language Learners to complete the worksheet.

- Problem 1 on the worksheet supports Example 2 in the student textbook. Note that students will have to visualize the two triangles separately to be able to identify the corresponding sides. You might have students identify the corresponding sides of the triangles before solving the problem.
- Think and Discuss supports the problem on the worksheet, as well as the other theorems of similarity presented in the lesson.

Making Connections

- Use Problem 1 to review students' comprehension of applying the SAS Similarity Theorem. Discuss what additional information they would need to know before they could use the AA Similarity or SSS Similarity theorems to prove similarity.

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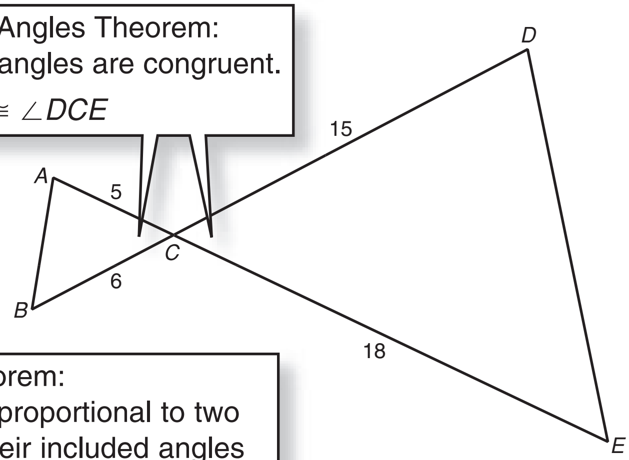
Problem 1

Verify that the triangles are similar.

Vertical Angles Theorem:
Vertical angles are congruent.
$\angle ACB \cong \angle DCE$



Side-Angle-Side Similarity Theorem:
If two sides of one triangle are proportional to two sides of another triangle and their included angles are congruent, then the triangles are similar.

Find the similarity ratios for the corresponding sides.

$$\left.\begin{array}{l} \dfrac{AC}{DC} = \dfrac{5}{15} = \dfrac{1}{3} \\[3em] \dfrac{BC}{EC} = \dfrac{6}{18} = \dfrac{1}{3} \end{array}\right\} \quad \frac{1}{3} = \frac{1}{3}$$

The triangles have two corresponding sides that are proportional.

The included angles are congruent, so $\triangle ABC \sim \triangle DEC$ by the Side-Angle-Side Similarity Theorem.

Think and Discuss

1. If you have two triangles with two proportional sides and one nonincluded congruent angle, are the triangles similar? Explain.

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2. Explain how you know that the two corresponding sides of the triangle in Problem 1 are proportional.

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CHAPTER 7

7-1 Ratio and Proportion

1. The variable that is mentioned first in the problem will be the numerator of the fraction.
2. You can use cross products. If the cross products are equal, then the proportions are equivalent.

7-2 Ratios in Similar Polygons

1. Congruent polygons are the same size and shape. Similar polygons are the same shape but may be a different size.
2. You have to match the corresponding sides so you can get the right similarity ratio for each pair of sides.

7-3 Triangle Similarity: AA, SSS, and SAS

1. The triangles might be similar, but you cannot prove they are similar with just this information.
2. You can write a proportion of the lengths of the sides and check whether or not they are equivalent.

7-4 Applying Properties of Similar Triangles

1. Set up the proportion by comparing the corresponding parts of the sides of the triangles.
2. If the ratios were not equal, then line $\overleftrightarrow{AB}$ would not be parallel to $\overline{XY}$.

7-5 Using Proportional Relationships

1. The diagram is larger than the gear. You can tell because the first part of the scale ratio represents the drawing. Because 4 cm is greater than 2 mm, the actual gear must be smaller than the diagram.
2. No; there would be a different scale for each state because the sizes of the states are very different.

7-6 Dilations and Similarity in the Coordinate Plane

1. You know the sides are corresponding sides because $\overline{PQ}$ is on the same side of the triangle as $\overline{PS}$ and $\overline{PR}$ is on the same side of the triangle as $\overline{PT}$.
2. You can name P as point 1 with the ordered pair $(-4, -3)$ corresponding to (x_1, y_1) and Q as point 2 with the ordered pair $(-2, 0)$ corresponding to (x_2, y_2). Then you can substitute the numbers from the ordered pairs into the formula.

CHAPTER 8

8-1 Similarity in Right Triangles

1. The square root represents a distance. Distance cannot be negative.
2. Use the Pythagorean Theorem:

   $(14\sqrt{5})^2 + (7\sqrt{5})^2 \stackrel{?}{=} 35^2$

   $980 + 245 \stackrel{?}{=} 1225$

   $1225 = 1225$

8-2 Trigonometric Ratios

1. Use the cosine ratio when the measure is given of a side that is adjacent to an angle whose measure is given and the hypotenuse is the measure that needs to be found. Use it also when the measure of the hypotenuse is known and the side whose measure needs to be found is adjacent to an angle whose measure is given.
2. The measure of a leg and the measure of one of the acute angles need to be known. Use the sine or cosine ratio (depending on the relationship between the leg and the angle) because both ratios include the hypotenuse.

8-3 Solving Right Triangles

1. They are the same; both ratios would use $\frac{XZ}{YZ}$. The cosine ratio uses the side adjacent to $\angle Z$, which is also the side opposite $\angle Y$ that can be used for $\sin Y$.

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